
A New Hysteranthous Species of *Chelonopsis* (Lamiaceae) from Southwest China

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ABSTRACT. A new species, *Chelonopsis praecox* Weckerle & F. Huber (Lamiaceae, Lamioideae) from southwest China, is described and illustrated, and its relationship to morphologically similar species is discussed. *Chelonopsis praecox* differs from the other species of the genus by its characteristic to bear flowers and fruits in springtime and early summer, before the development of leaves during the summer rainy season, while all other *Chelonopsis* species flower during summer or autumn. Prominent distinguishing morphological features are found in the stem bark, leaf size and indumentum, and inflorescences. So far, the species is only known from the northern part of the Shuiluo Valley in southwest Sichuan; additional collections are necessary to clarify its full distributional range.

Key words: *Chelonopsis*, China, Himalayas, IUCN Red List, Lamiaceae, Lamioideae.

Chelonopsis Miquel (Lamiaceae) includes approximately 16 species distributed in East Asia, and of these, 13 occur in China (Li & Hedge, 1994; Mabberley, 1997). The genus is currently placed in the subfamily Lamioideae (Harley et al., 2004). It was formerly placed in the subtribe Melittidinae, together with five North American genera (*Brazoria* Engelm. & A. Gray, *Warnockia* M. W. Turner, *Macbridea* Rafinesque, *Physostegia* Benth., and *Synandra* Nutt.) and the monotypic European genus *Melittis* L. (Cantino, 1985; Wagstaff et al., 1995; Turner, 1996). However, Scheen et al. (2008) showed that the

above circumscription of the subtribe Melittidinae is polyphyletic. While the North American genera form a monophyletic group, the placement of *Melittis* and *Chelonopsis* needs further investigation.

Chelonopsis comprises herbs and shrubs with 2-lipped, white to yellow or purple-red flowers, bearing characteristic anthers with bearded pollen sacs. The 13 species distributed in China have been partly revised for the English version of the *Flora of China* (Li & Hedge, 1994), but a complete revision of the genus is lacking to date.

In this paper, a new species is described that is morphologically similar to *Chelonopsis forrestii* J. Anthony, *C. mollissima* C. Y. Wu, and *C. rosea* W. W. Smith. An overview of the discriminating characters of these four species is provided.

MATERIALS AND METHODS

This study is based on the morphological analysis of plant material collected in the Shuiluo Valley, Muli County, Liangshan Prefecture, Sichuan Province, People's Republic of China, as well as herbarium specimens from the herbarium of the Kunming Institute of Botany, Chinese Academy of Sciences (KUN). A list of the specimens examined is given in Table 1. For the description of the new species, 10 individuals were investigated, and for each individual 10 to 21 leaves were measured, for a total of 128 measurements. Leaf and petiole sizes provided correspond to the interdecile range; minimum and

Table 1. Morphological comparison of *Chelonopsis praecox* with *C. forrestii*, *C. mollissima*, and *C. rosea*.¹

Character	<i>C. praecox</i>	<i>C. forrestii</i>	<i>C. mollissima</i>	<i>C. rosea</i>
Habitat	dry thickets and streamside thickets; 2000–2400 m; Sichuan	forests and streamside thickets; 2500–3100 m; Yunnan and Sichuan	dry thickets on open slopes in valleys; 1200–2500 m; Yunnan and SW Sichuan	Open thickets; 1500–3100 m; Yunnan
Habit	shrubs 1–3 m tall	shrubs 1–2 m tall	shrubs ca. 1 m tall	shrubs 1–2.5 m tall
Stems	stems straw-colored, bark peeling	stems straw-colored to yellow-brown, bark peeling	branches straw-colored to brown, with longitudinal fissures	branches straw-colored to brown, bark not peeling
Stem indumentum	very densely pilose, few glands	sparsely pubescent to subglabrous	densely pilose, sometimes with branched hairs	densely villous, with glandular hairs
Leaf shape	leaf blade broadly ovate, base subcordate to cordate, apex short acuminate to acute, sometimes with additional leaflets on petiole	leaf blade ovate-lanceolate, base slightly asymmetrical, acute to rounded or cordate, apex acute to acuminate	leaf blade ovate, base cordate to subcordate or obtuse to rounded, apex acute	leaf blade broadly ovate, base cordate to rounded, apex acute to acuminate
Leaf margin	shallowly serrate to serrate-crenate	shallowly serrate to subentire, ciliate	coarsely serrate-crenate	serrate-crenate to biserrate
Leaf size	(3.8–)5.4–9.7(–11.2) × (2.7–)4–6.8(–8.5) cm	4–7.5(–15) × 1.5–3(–5) cm	3–6 × 2.5–4.5 cm	3–9 × 2–5.5 cm
Leaf indumentum	densely pilose adaxially, very densely pilose and glandular abaxially	sparsely pubescent adaxially, sparsely pubescent and glandular abaxially	densely pilose, sometimes with branched hairs, sometimes with glands	villous and glandular adaxially, densely so mainly along veins abaxially
Petiole	(1–)1.5–4.8(–6.8) cm	3–5(–7) mm	1–3(–5) cm	1–4.5 cm
Inflorescence	cymes 1(2)-flowered	cymes 1-flowered	cymes 1- to 3-flowered	cymes usually 3-flowered
Bracteoles	ovate to elliptic, 4–6 × 2–3 mm	linear, ca. 5 mm	ovate to oblanceolate to linear, 2–7 × 0.5–3 mm	mainly linear, 4–8 mm
Calyx indumentum	densely pubescent with glandular hairs externally, glabrous internally	with sparse white cilia externally, glabrous internally	externally and internally puberulent	pubescent externally, glabrous except for pubescent teeth internally
Corolla color	creamy white, tinged purple or red-purple spotted	creamy white with purple to purple or red, with purple lines on tube or purple spotted	white with tip of upper lip faint red to rose to red	rose to purple
Phenology	flowering March, fruiting June	flowering June–August	flowering October–December	flowering August–December, fruiting September–December

¹ The data in the table are based on Li and Hedge (1994) and the following herbarium specimens: *Chelonopsis forrestii* Anthony. CHINA. **Sichuan:** Litang Valley, June 1922, *Forrest 21356* (E holotype [photo]); Muli, 23 Aug. 1983, *Qing T. D. 13290* (KUN). **Yunnan:** s. loc., 18 June 1937, *Yü T. T. 6409* (KUN); s. loc., 10 July 1937, *Yü T. T. 6970* (KUN); s. loc., *Anonymous 3716* (KUN). *Chelonopsis mollissima* C. Y. Wu. CHINA. **Yunnan:** Luquan (xian), Zhongping (xiang), Jiangbian (cun), 12 Nov. 1952, *Mao P. Y. 01727* (KUN holotype); Luquan (xian), Zhongping (xiang), Jiangbian (cun), 12 Nov. 1952, *Mao P. Y. 01728* (KUN); Huize (xian), Jiduo (xiang), Yinchangpu (cun), 19 Dec. 1952, *Mao P. Y. 02037* (KUN); Lijiang, nearby Shang Fengke, 3 Oct. 1983, *Qing T. D. 14940* (KUN). **Sichuan:** Muli, Shuiluo Valley, 28 Sep. 2005, *Weckerle & Huber 050928-1/1* (KUN, Z). *Chelonopsis rosea* W. W. Smith. CHINA. **Yunnan:** Dali region, Aug. 1913, *Forrest 11682* (E holotype [photo]); Jing-Dong, Hua Shan, 10 Dec. 1939, *Li M. K. 2371* (KUN), 11 Dec. 1939, *Li M. K. 2392* (KUN); Meng Hua, near Wuliang Shan, 26 Sep. 1933, *Tsiang Y. 12073* (KUN); Shunning, Litah, 10 Sep. 1938, *Yü T. T. 17603* (KUN); Mienning, Taniuchuan, 13 Nov. 1938, *Yü T. T. 18204* (KUN); Gengma, along rd. from Mengsa to Xiaohaokeng, 3 Dec. 1958, *Zhu T. P. 0451* (KUN).

maximum measured values are provided in parentheses.

RESULTS AND DISCUSSION

Chelonopsis praecox Weckerle & F. Huber, sp. nov. TYPE: China. Sichuan: Muli Co., Shuiluo Valley, vic. of Lanman village along roadside, 28°19'58.9"N, 100°39'29"E, 2210 m, 15 Mar. 2005 (fl.), C. S. Weckerle & F. K. Huber 050315-1/1 (holotype, Z; isotype, KUN). Figure 1.

Haec species ab omnibus speciebus ceteris generis *Chelonopsis* Miquel florescentia verna (foliis hysteranthi) distincta; etiam a *C. forrestii* J. Anthony petiolo longiore, foliis late ovatis atque bracteolis ovatis ellipticisve, a *C. mollissima* C. Y. Wu habitu altiore atque calyx intus glabro, a *C. rosea* W. W. Smith flore cremeo, a *C. forrestii* et *C. mollissima* foliis majoribus, a *C. forrestii* et *C. rosea* foliis dense pilosis, a *C. mollissima* et *C. rosea* cortice exfoliato atque cymis unifloris distinguitur.

Shrub 1–3 m tall, branches subterete to terete, straw-colored, bark peeling; young branches very densely pilose with few glands. *Leaf* blade broadly ovate, (3.8–)5.4–9.7(–11.2) × (2.7–)4–6.8(–8.5) cm, base subcordate to cordate, apex short acuminate to acute, densely pilose adaxially, very densely pilose abaxially, glandular (aromatic), margin shallowly serrate to serrate-crenate; petiole (1–)1.5–4.8(–6.8) cm, sometimes bearing small leaflets. *Inflorescence* cymose, solitary or paired, or terminal on leafy axillary branchlets, 1(2)-flowered; bracteoles 2, ovate to elliptic, 4–6 × 2–3 mm, densely pilose. *Calyx* tubular-campanulate, teeth 5, triangular, apex acute to attenuate, externally densely pubescent, with glandular hairs, internally glabrous, 1.6–1.9 cm long in flower (tube 0.9–1 cm), 1.7–2.3 cm long in fruit (tube 1.2–1.6 cm); *corolla* creamy white, tinged purple or red-purple spotted, externally densely pubescent, internally glabrous, 2.8–3.5 cm (tube 2.3–2.5 cm), upper lip ca. 3 × 9 mm, entire, middle lobe of lower lip ca. 7 × 5–6 mm, subentire, lateral lobes 2–3 × 5–6 mm; *stamens* with bearded pollen sacs and puberulent filaments; *style* equally 2-cleft. *Nutlets* straw-colored to brown, oblong, 1–1.4 × 0.2–0.4 cm, winged at apex, finely striate.

Distribution and habitat. *Chelonopsis praecox* is known only from the northern part of the Shuiluo Valley, Muli County, southwest Sichuan, People's Republic of China, and is frequently found in streamside thickets at altitudes from 2000–2400 m. Additional collections are necessary to clarify its full distributional range.

IUCN Red List category. Due to the lack of distributional data for *Chelonopsis praecox* outside the

Shuiluo Valley, it seems appropriate to assign a conservation status of Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Phenology. *Chelonopsis praecox* has been collected in flower in March and in fruit in June. The species flowers during springtime, while leaves are produced at the beginning of the rainy season starting in the area in June or July.

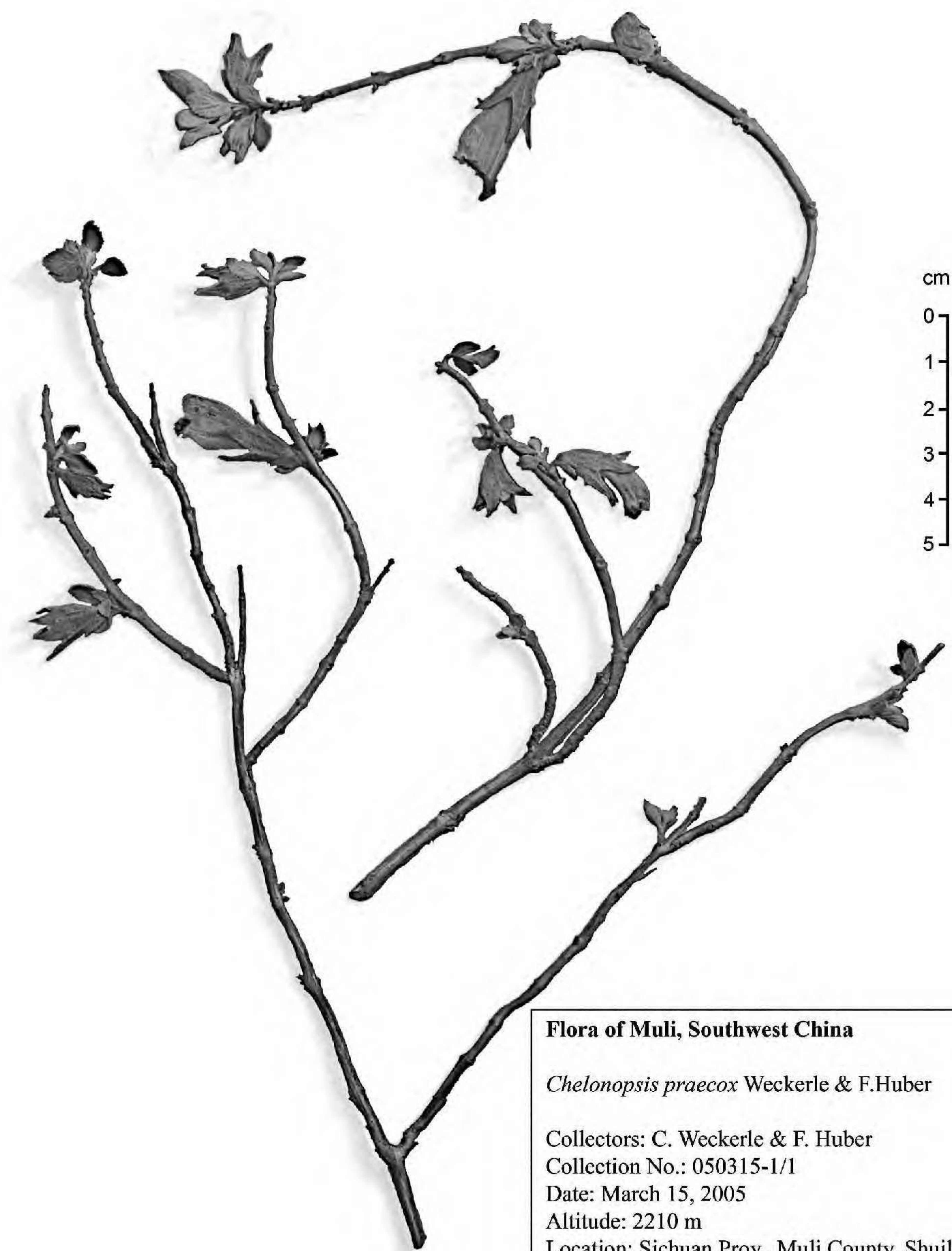
Etymology. The specific epithet recognizes the characteristic of the new species to bear flowers before leaves, a unique feature in the genus *Chelonopsis*.

Discussion. The flowering and fruiting season of *Chelonopsis praecox* is confined to spring and early summer, followed by the development of the leaves during the summer rainy season. For *Chelonopsis*, this phenological feature is exclusively found in the new species described here. Therefore, we prepared a holotype consisting of a flowering specimen and a paratype consisting of a leaf-bearing specimen (Weckerle & Huber 050925-1/1 [Z], see Figs. 2 and 3). All other species of *Chelonopsis* flower and fruit during summer or autumn, when their leaves are fully developed (Hedge, 1990; Murata & Yamazaki, 1993; Li & Hedge, 1994).

Chelonopsis praecox is morphologically similar to *C. forrestii*, *C. mollissima*, and *C. rosea*. However, it is the only species of this group that shows a seasonal pattern of flower and leaf development. From *C. forrestii* it differs mainly by its habitat at 2000–2400 m (vs. 2500–3100 m), densely pilose stem and leaves (vs. sparsely pubescent), larger leaves and longer petioles, broadly ovate leaf shape (vs. ovate-lanceolate), and ovate to elliptic bracteoles (vs. linear); from *C. mollissima* it differs by its taller habit (1–3 m vs. ca. 1 m), peeling bark, larger leaves, 1(2)-flowered cymes (vs. 1- to 3-flowered), and the calyx internally glabrous (vs. puberulent); and from *C. rosea* it differs by its peeling bark, densely pilose leaves (vs. villous), 1(2)-flowered cymes (vs. 3-flowered), and creamy white flowers (vs. rose to purple).

A detailed comparison of the new species with the three morphologically similar species is given in Table 1. The data are based on Li and Hedge (1994) and have been amended according to the herbarium specimens listed in Table 1, particularly for the following characters: habitat, habit, stem indumentum, leaf shape, leaf size, leaf indumentum, petiole, bracteoles, and phenology.

Paratypes. CHINA. Sichuan: Muli, Shuiluo Valley, vic. Lanman village in small valley to Shuiluo River, 28°19'50.6"N, 100°39'40.2"E, 2140 m, 25 Sep. 2005 (mature leaves), C. S. Weckerle & F. K. Huber 050925-1/1



Flora of Muli, Southwest China
Chelonopsis praecox Weckerle & F. Huber
Collectors: C. Weckerle & F. Huber
Collection No.: 050315-1/1
Date: March 15, 2005
Altitude: 2210 m
Location: Sichuan Prov., Muli County, Shuiluo Valley, Lanman Village (28°19'58,9"N; 100°39'29,0"E); in the vicinity of Lanman along roadside
Habit: Shrub, ca. 1.5 m high
Ethnobotanical Notes: Branches can be put on the fields as fertilizer
Det: C. Weckerle & F. Huber

Figure 1. Holotype of *Chelonopsis praecox* Weckerle & F. Huber (Weckerle & Huber 050315-1/1, Z).

**Flora of Muli, Southwest China**

Chelonopsis praecox Weckerle & F. Huber

Collectors: C. Weckerle & F. Huber

Collection No.: 050925-1/1

Date: September 25, 2005

Altitude: 2140 m

Location: Sichuan Prov., Muli County, Shuiluo Valley, Lanman Village (28°19'50,6"N; 100°39'40,2"E); in a small valley leading to the Shuiluo River

Habit: Shrub, up to 2.5 m high

Notes: Leaves fragrant (*Citrus*- or *Geranium*-like), flowering before rain season

Det: C. Weckerle & F. Huber

Figure 2. Paratype of *Chelonopsis praecox* Weckerle & F. Huber (Weckerle & Huber 050925-1/1, Z).

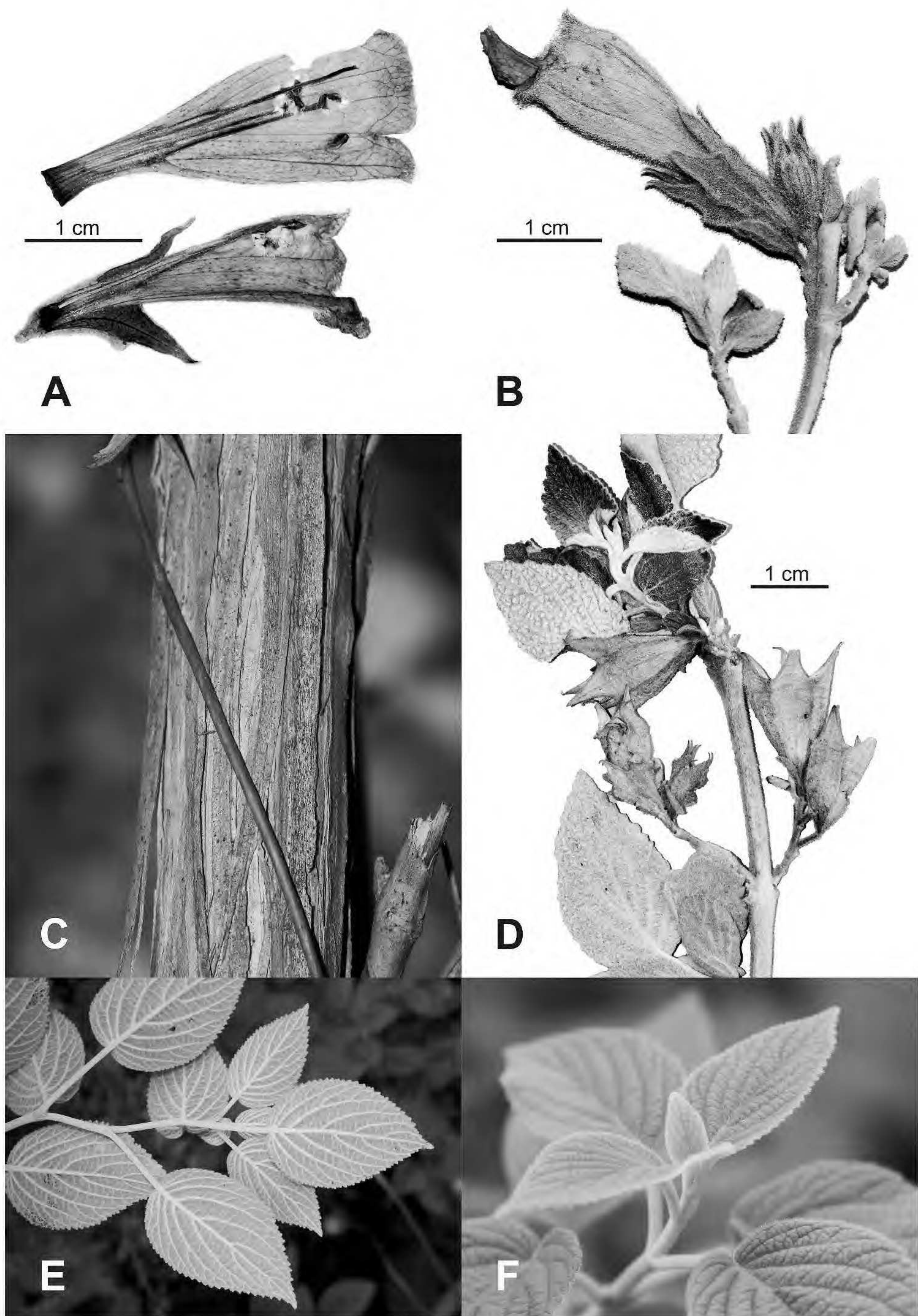


Figure 3. Photos of the new species *Chelonopsis praecox* Weckerle & F. Huber. —A. Longitudinal section of two dry flowers, showing the bearded anthers. —B. Flower. —C. Peeling bark of the stem. —D. Fruits and emerging leaves. —E. Leaves, abaxial view. —F. Leaves, adaxial view. A, B from the holotype *C. Weckerle & F. Huber 050315-1/1* (Z); D from the paratype *C. Weckerle & F. Huber 040604-2/1* (Z).

(Z), 050925-1/2 (Z), 050925-1/3 (Z); Muli, Shuiluo Valley, 4 June 2004, C. S. Weckerle & F. K. Huber 040604-2/1 (Z); Muli, Shuiluo Valley, 11 June 2004, C. S. Weckerle & F. K. Huber 040611-1/1 (KUN, Z).

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